

INTERPINE

Forestry Innovation

Forest Condition Monitoring (FCM) Manual Update Task 2

Prepared for **NZ Forest Owners Association**

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Interpine Forestry Ltd
P.O. Box 1209, Rotorua
Telephone. (07) 345 7573, **Facsimile.** (07) 345 7571
Email. info@interpine.co.nz
Website. www.interpine.com



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2 INTRODUCTION

In 2010 the New Zealand Forest Owners Association (NZFOA) contracted Interpine Forestry Limited (Interpine) to design and undertake the first measurement of a forest condition monitoring (FCM) programme in New Zealand. Interpine identified the planted forest portion of the Ministry for the Environment (MfE) national plot network, established to provide an inventory of carbon in New Zealand's forests, as a suitable and practical sampling frame for the collection of FCM data. Interpine recorded FCM indicators on 190 plots concurrently with their carbon measurements during the winter of 2010.

International research indicates that to facilitate effective data collection of subjective measurements such as FCM indicators it is important to have a comprehensive manual and photographic guide. This document¹ was produced by Interpine before the 2010 measurement commenced and the NZFOA have requested that Interpine use the knowledge gained through the 2010 experience to update and improve the FCM manual.

The 2010 measurement also took place concurrently with the measurement MfE's carbon measurement inventory and as such FCM indicators were recorded on trees measured as part of this inventory. As a result the original manual did not contain any information on plot establishment or tree selection as it was assumed that these would be dealt with by the measurement procedures of MfE's carbon inventory.

Therefore the objectives of the manual upgrade are as follows:

- To use the knowledge gained in the 2010 inventory to produce an improved FCM manual to ensure better data collection:
- To include new material in the FCM manual which will allow the document to be used as a stand-alone document independent of any other measurement programmes.

¹ FCM Data Collection Manual v1.2.1 – Interpine Forestry Limited

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3 METHODOLOGY

The methodology followed by Interpine during the FCM manual revision is outlined in the following sections.

3.1 QUESTIONNAIRE AND DISCUSSION

A questionnaire was circulated to all field staff and field managers who took part in the 2010 FCM measurement. The field teams had been trained in the collection of FCM characteristics and used the manual for the collection of FCM characteristics. The questionnaire distributed to all field crews is included in Appendix 1. The questionnaire was complimented with a follow up workshop attended by the field crews where any issues arising from the 2010 measurement were discussed.

4 FINDINGS AND ACTIONS FROM CREW FEEDBACK

This section documents the findings of the discussions with FCM inventory team leaders and feedback from the questionnaire relating to the manual upgrade. In each case if an action is required the action taken in response to the finding is also documented.

Finding 1.

Although the figures relating to the definition of assessable crown for transparency and defoliation were generally thought to be clear, several technicians requested more instruction around defining assessable crown in young trees.

Action 1.

In response to this finding more figures detailing the definition of the assessable crown when measuring defoliation and crown transparency were added to section 4.4.9 of the manual.

Finding 2.

The description of how to measure needle retention requires additional work. It was noted that in many NZ surveys the description of the measurement of needle retention and in particular where to assess it is not adequately defined. It was also noted that a photographic guide such as that used included in the manual for crown transparency and defoliation would be beneficial for technicians to “calibrate” their needle retention scoring.

Action 2.

Additional detail on the measurement of needle retention was included into section 4.8.2 of the manual. These include photographic reference to the section of the crown within which needle retention should be assessed which have been absent from manuals detailing the assessment of needle retention in the past. Additionally all photographs in the photographic reference guide have been scored by a team of experienced assessors and these scores added to the manual to provide a reference guide for the assessment of needle retention.

Finding 3.

The description of the measurement of crown dieback was identified by several technicians as insufficiently detailed.

Action 3.

Additional description of crown dieback has been added to the text of the manual. Photographs of dieback have been acquired and added to the manual.

Finding 4.

References to more detailed guides on the assessment of *Dothistroma* and *Cyclaneusma* should be included in the FCM manual.

Action 4.

References to these detailed guides have now been added.

Finding 5

It was identified that there is some confusion about the assessment of FCM indicators for trees with a fork below 1.4m

Action 5

A new section detailing assessment of trees with a DBH below 1.4m has been added to the manual. Through a consultation process it was decided that trees with a fork below 1.4m should be treated as two trees but no attempt should be made to differentiate between the crowns of the two trees and the same FCM scores should be recorded for both trees.

Finding 6

It was identified that technicians were confused about the defoliation variable and it seemed that they were looking for the presence of dead needles rather than scoring trees for the absence of needles when compared to a fully foliated tree.

Action 6.

To remedy finding 6 text explicitly outlining the requirement for technicians to score the absence of needles as compared to a fully foliated tree rather than looking for the presence of dead foliage was added to the manual.

Finding 7

More detail is needed for explaining how to deal with tree architecture when assessing transparency.

Action 7

More detail relating to dealing with tree architecture when assessing transparency was added to the manual.

5 ADDITIONAL MATERIAL ADDED TO THE MANUAL

To allow the manual to function fully as a stand-alone document the following sections have been added:

- 4.1 Site access
- 4.2 Land owner permission
- 4.3 Site Description
- 4.4 Site Layout
 - 4.4.1 Using a GPS for navigation
 - 4.4.2 Navigating to a plot centre
 - 4.4.3 Site Marking
 - 4.4.4 Witness Trees
 - 4.4.5 Plots that cannot be established
 - 4.4.6 Locating a pre-existing plot centre
 - 4.4.7 Plot size
 - 4.4.8 Plot boundary definition
 - 4.4.9 Dealing with plots containing no *P. radiata* trees
 - 4.4.10 Where plots fall partly in an area of *P. radiata* forest
 - 4.4.11 Moving a FCM plot
- 4.5.2 Tree dimensions
- 4.5.6 Dealing with Forked trees

6 APPENDIX 1

Summary of field team feedback.

The results of the consultation process are outlined in the following sections

Questionnaire answers

1. Do you think there is sufficient detail on the background to FCM and crown condition in the manual?

- Yes
- Yes
- Yes

2. Did you find the quick reference over view flow chart and quick guide to forest condition indicators useful during the 2010 measurement?

- Yes
- Yes
- Yes

3. Was the manual robust enough (did it fall apart in the rain?)?

- Yes
- Yes
- Yes

4. Were the definitions of assessable crown for defoliation and transparency clear enough?

- Yes
- Yes they were
- Definitions were good and the diagrams followed by definitions made things simple

5. Were the diagrams showing the definition of assessable crown for defoliation and transparency helpful?

- Yes
- Yes
- Diagrams were quite good. Maybe more details for young trees would be good.

6. Are the instructions on where to assess FCM characteristics from and how to record the position of assessment clear enough?

- Yes
- Yes
- Yes

7. Are the instructions on measuring stem visibility and the scale and photographic reference provided in the manual clear enough?

- Yes
- Should be detailed more
- Yes

8. Is the definition of needle retention and the description of how to measure it detailed enough?

- Need explanation that “the lower third of the unsuppressed green crown is the average green crown level across all forest trees in that area. Needle retention is one indicator that people find difficult to grasp so the more explanation / photos the better
- Yes
- Needle retention was a little confusing. I found needle retention hard to judge a few times

9. Is the definition of crown dieback clear enough?

- It seemed to be but from working with other assessors this season I observed that this was one indicator people had trouble with. People don't seem to know what they are looking at and are likely to just come up with a number. I'm not totally clear myself what dieback includes.
- Not very clear – Needs to be explained better in the manual
- Yes

10. Are the instructions on measuring crown depth and the scale and photographic reference provided in the manual clear enough?

- Yes
- Yes
- Yes

11. Are the instructions on measuring Dothistroma and the scale and photographic reference provided in the manual clear enough?

- Yes – but maybe include a reference to another more detailed guide on measurement
- Yes
- Yes

12. Are the instructions on measuring Cycloneusma and the scale and photographic reference provided in the manual clear enough?

- Yes but include a reference to another more detailed guide book on this assessment
- Yes

- Yes

13. Are the instructions on measuring Resin Bleeding and the scale and photographic reference provided in the manual clear enough?

- Yes
- Yes
- Yes

Photographic Guide

14. Are the age class definitions in the manual easy enough to understand?

- Yes very good
- Not very easy to understand
- Yes

Please provide comments on the Young Crop photographs

(Any photos missing ?/ Any photos inappropriate or unclear?/ are there enough photographs?/ Are any photos misleading?)

- Well covered
- I think the photos are okay
- Photographs were clear and helpful but a few more photographs in terms of transparency as there was a lot of variety in the young crop

Please provide comments on the Mid Rotation photographs

(Any photos missing ?/ Any photos inappropriate or unclear?/ are there enough photographs?/ Are any photos misleading?)

- Well covered range
- Photos ok
- Don't remember there being a problems

Please provide comments on the Old Crop photographs

(Any photos missing ?/ Any photos inappropriate or unclear?/ are there enough photographs?/ Are any photos misleading?)

- Well covered
- Photos ok
- Photographs were all clear and detailed.

Further feedback

Guys I worked with still had a hard time with the whole procedure, it would have become easier with time (and range of habitats).

Quite often mistakes were made in the assigning of different scores to the top versus the whole tree. I found it useful to tell the guys to rank the 50% first, compare it to the bottom and half the result. ie top 50% at 20%, bottom at 60%, so whole tree 40%. Also found it good for guys to break into quarters, ie is the whole tree 100%-75%, 75%-50%, 50% - 25%, 25%-0%. Found these groupings very easily obtained. From there they could relate score to the mid point of the quartiles, ie is it > 80%, sounds complicated but easy (and consistent) in the field.

For the crown transparency at times the guys were not taking the tree architecture into account and not calling the gaps between branches.

I would think that a version of this would prove very useful for the crown transparency indices and the dieback one as well.

we found a huge variability in figures dependent on where assessment taken from

had trouble interposing the stem visibility and the crown depth scores, just one of those things.

defoliation of accessible crown was the other main one we had trouble with, guys often having to see dead foliage as opposed to missing foliage before they would call it.

Besides that the framework of the manual is fine and the only comments I would make are to avoid people looking for examples of a score as opposed to making the assessment themselves.

For further information please contact:

Jonathan Dash

Resource Forester

B.Sc. (Hons) M.Sc. (Forestry) MNZIF

Email : jonathan.dash@interpine.co.nz
Mobile : 021 2435 655
Telephone : 07 345 7573
Facsimile : 07 345 7571

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